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ABSTRACT

To assist the clinician or researcher in scale selection, four symposium papers discussed instruments available to measure test anxiety (TA), with special attention given to the newly-developed Test Anxiety Inventory (TAI). Following an integrative summary delivered by the chairperson (DeVito), the first paper (Conetta and Tryon) reviewed the two basic types of self-report TA instruments--those measuring global TA and those measuring specific aspects of TA separately--and reported their use in TA literature. The second paper (DeVito, Tryon, and Kane) provided additional validity data for the TAI. The TAI emotionality and worry scales were correlated with the Mooney Problem Check Lists (PCL) items using data from 525 college freshmen. PCL items significantly related to the TAI were considered with regard to the validity of the TAI and implications for the theory and understanding of TA. The third paper (Kane, DeVito, and Tryon) discussed the relationship of the TAI to the Survey of Study Habits and Attitudes and selected Strong-Campbell Interest Inventory scales. The final paper (Carlson and DeVito) reported a study of 273 freshmen on the equivalence of actual and recalled measures of test anxiety using the A-state scale of the State-Trait Anxiety Inventory. (Author/BS)

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Symposium

The Measurement of Test Anxiety

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Anthony J. DeVito, Georgiana Shick Tryon, and Alison Kane, Counseling Center, Fordham University. Validation of the TAI using items of the Mooney Problem Check Lists.

Alison Kane, Anthony J. DeVito, and Georgiana Shick Tryon, Counseling Center, Fordham University. The Test Anxiety Inventory related to the Survey of Study Habits and Attitudes and selected scales of the Strong Campbell Interest Inventory.

Janet F. Carlson and Anthony J. DeVito, Counseling Center, Fordham University. Measuring test anxiety with the A-state scale of the State-Trait Anxiety Inventory.

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Abstract

Instruments available to measure test anxiety (TA) were discussed with special attention given to the newly-developed Test Anxiety Inventory (TAI). The TAI emotionality and worry scales were correlated with the Mooney Problem Check Lists (PCL) items. PCL items significantly related to the TAI were considered with regard to validity of the TAI and implications for the theory and understanding of TA. The relationship between TA and study habits and attitudes was also discussed. Conceptualizing TA as state anxiety under examination stress conditions permits the measurement of TA using the A-state scale of the state-trait anxiety inventory.

Integrative summary of chair

The first paper within this symposium discusses standard psychological instruments available to measure test anxiety (TA). These instruments, designed especially for the purpose of measuring TA, are divided into two types: those measuring global TA and those measuring specific aspects of TA. The frequency with which these instruments are used in the literature is discussed. Of the scales measuring specific aspects of TA, the Test Anxiety Inventory (TAI; Spielberger, 1980) measuring emotionality, worry, and total TA is probably the strongest in its theoretical and psychometric development.

The validity data for the TAI presented by Spielberger (1980) is generally construct in nature, consisting of factor analyses and correlations with other personality tests. Examining the relationship of the TAI with other indices of behavior not only enhances our understanding of TA but also extends the validity information available for the TAI. The second paper within this symposium focuses on the relationship of the TAI with individual items on the Mooney Problem Check Lists (PCL; Mooney & Gordon, 1950), a self-report inventory of various behaviors and problems.

There were about 20 PCL items related to the TAI worry and emotionality subscales (at the .02 or better significance level). Over half of these items related to adjustment to college work and curriculum and teaching procedures. These findings further validate the TAI as a measure of TA. Several of the remaining PCL items seem to correspond with the theoretical view of TA as a reaction to parental criticism (Sarason, Davidson, Lighthall, Waite, & Ruebush, 1960). While the TAI was largely validated as an instrument to measure TA, little emerged in the second paper to support the TAI's distinction between worry and emotionality.

Research in the treatment of TA shows a relationship between TA and study habits and attitudes. In the third paper, we present correlational data for the TAI scales and the Survey of Study Habits and Attitudes (SSHA; Brown & Holtzman, 1967) consisting of study habit (delay avoidance and work methods) and study attitude (teacher acceptance and educational approval) subscales. The TA measures were related to all SSHA subscales, especially work methods and teacher acceptance. For some, increased anxiety before and during tests may be due to inadequate preparation and poor mastery of the subject matter, but the correlational nature of the research does not permit a conclusion regarding causality.

The TAI appears to be a well developed instrument, and we believe we have contributed to its validation. The approach most often taken to measure TA uses instruments like those discussed in the first paper; another approach uses an instrument not specifically designed for this purpose. TA may be conceptualized as a form of trait anxiety; in which case, it follows that those high in TA will exhibit elevations in state anxiety (A-State) under examination stress conditions (DeVito & Kubis, in press; Spielberger, Anton, & Bedell, 1976). The fourth paper discusses the measurement of TA by administration of the A-State scale of the State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, & Lushene, 1970) immediately before an examination. Alternatively, to avoid the discomfort, intrusiveness, and inconvenience of being asked to take psychological tests during an examination, the person could be asked to respond to the A-State scale while recalling how he or she felt during a test previously taken. Several lines of evidence would suggest that using an actual or recalled measure of A-State under examination stress is a viable way to measure TA: (a) In the research reported in the fourth paper of the symposium, we found no significant

difference between actual and recalled TA as measured by the A-State scale of the STAI. (b) High correlations between recalled and actual TA (r = .54, $p<.01$, for males; r = .74, $p<.001$, for females) have been found even though the examination for Actual TA was different from the examination used for recalled TA (DeVito & Kubis, in press); one would expect an even higher correlation if the examination of reference for actual and recalled TA had been the same. (c) Spielberger, Gonzalez, Taylor, Algaze, and Anton (1978) reported fairly high correlations (ranging from .61 to .86) between A-State measured under imagined examination stress conditions and the TAI scales.

One advantage of assessing TA using the STAI A-State scale is that the assessment could be achieved with reference to a specific test, course, or subject area (e.g., with reference to math tests so as to better measure math anxiety). The efficacy of clinical or experimental interventions aimed at anxiety reduction is probably better assessed using a state anxiety measure.

In summary, the clinician or researcher selecting a scale to measure TA has many from which to choose. The TAI is the instrument of choice for most applications if a fairly general and stable measure is desired or if the emotionality and worry aspects of TA are of interest. For certain clinical and research applications, one may wish to consider using the STAI A-State scale with standard or modified instructions.

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First Paper

(1) Title of paper

Standard psychological instruments to measure test anxiety

(2) Problem or major purpose

The psychologist wishing to assess test anxiety (TA) will find a number of available instruments. The purpose of this paper is to review the various self-report TA measures and report their use in TA literature. There are basically two types of self-report TA instruments: those measuring global TA and those measuring specific aspects of TA separately.

(3) Instruments measuring global TA

The first assessment device for TA was a 42-item inventory developed by Mandler and S. Sarason (1952) to measure students' subjective experiences before and during individual intelligence tests, group intelligence tests, and course examinations. This instrument was called the Test Anxiety Questionnaire (TAQ) and was subsequently reduced to 36 items (S. Sarason & Mandler, 1952). Students respond to each item by placing a mark along a 15-centimeter line which has the midpoint and endpoints indicated. A mark above the midpoint is scored "1" and a mark below the midpoint is scored "0."

Six years after the development of the TAQ, I. Sarason (1958) devised the Test Anxiety Scale (TAS) which consisted of 21 true-false items most of which were rewritten from the TAQ. Sarason and Ganzer (1962) subsequently devised a 16-item TAS and the current 37-item TAS was developed by Sarason in 1972.

Another measure of global TA is the Suinn Test Anxiety Behavior Scale (STABS; Suinn, 1969) which consists of 50 items describing behavioral situations which arouse test anxiety. Students respond to each item on a 5-point scale. Suinn presented norms for both a Caucasian and an Oriental college population.

(4) Instruments measuring various aspects of TA

In their original article on TA, Mandler and S. Sarason hypothesized the existence of anxiety responses which facilitated test completion as well as debilitating anxiety responses; however, the TAQ measures only debilitating anxiety. Alpert and Haber (1960) developed the Achievement Anxiety Test (AAT) to measure both debilitating and facilitating anxiety. The AAT has two scales: a 10-item Debilitating Scale (AAT-) and a 9-item Facilitating Scale (AAT+). Nine neutral buffer items are included, and subjects respond to the items on a 5-point scale. The scales are significantly correlated despite the authors' attempts to make them independent.

More recent advances in TA theory and research indicate that TA has two components: a worry factor and an emotionality factor. Wine (1971) stated that the high test-anxious person attends to both self-relevant and task-relevant variables during tests while the low test-anxious person attends mostly to task-relevant variables. In other words, the high test-anxious person worries during examinations. The emotionality component of TA is affective and physiological in nature. Test worry interferes with examination performance while test emotionality, although uncomfortable, generally does not lead to decrements in exam performance (Morris & Liebert, 1969).

Instruments measuring worry and emotionality are descended from the TAQ. Citing a factor analytic study of the TAQ which they felt indicated that test anxiety was composed of a worry and an emotionality factor, Liebert and Morris (1969) developed the Worry-Emotionality Questionnaire (W-E Q). The W-E Q is composed of 10 TAQ items which have been modified to refer to immediate feelings. The test has a 5-point Emotionality Scale and a 5-item Worry Scale.

Another worry-emotionality inventory, the Inventory of Test Anxiety (ITA), was developed by Osterhouse (1970). This 16-item scale contains items from the W-E Q, items from other test anxiety instruments, and items written by Osterhouse. The worry and emotionality scales are each composed of 8 items.

Recently Spielberger and associates (1978, 1980) developed the Test Anxiety Inventory (TAI). The 20-item TAI yields a total TA score as well as separate worry and emotionality scores. The worry and emotionality subscales are each composed of 8 items. Work on the TAI began in 1974 using items from the TAS and items written by Spielberger. Extensive factor analytic work resulted in the final scale. Norms are provided for college undergraduates, college freshmen, community college students, and high school students. No other TA inventory has such extensive norms. Spielberger and associates also conducted extensive validity studies correlating TAI scores with scores from other measures of TA as well as scores from various personality tests and measures of aptitude and achievement. The psychometric work conducted with the TAI has enabled it to become the best measure of TA currently available.

(5) Use of TA scales in the treatment literature

The various TA instruments have been used to assess outcomes of therapies directed toward alleviating TA. The TAS is the most frequently administered scale while the ITA is the least frequently administered scale. Because of its recent development, the TAI has not often appeared in the treatment literature.

Although most TA inventories are correlated, conclusions reached with one instrument will sometimes be different from those reached with another instrument (Tryon, 1980). Consequently, many authors use more than one assessment device. Also, researchers do not always specify which version of a

scale is used and sometimes modify scales to fit the needs of their studies. Measures of TA generally show improvement for most any treatment technique.

(6) Implications and conclusions

In summary, the TAI is currently the best instrument for assessing test anxiety. It is an outgrowth of the original assessment device, the TAQ, and has benefited from research on the TAQ and its descendents (TAS, W-E Q, ITA). The TAI was developed in a careful, step-wise manner. It measures worry and emotionality better than any other instrument.

Researchers would do well to include the TAI as part of a battery assessing treatment outcomes. Consistent use of the TAI would enable comparison of results of different studies and would provide an evaluation of each treatment's effectiveness in modifying both worry and emotionality.

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Second Paper

(1) Title of paper

Validation of the Test Anxiety Inventory Using Items of the Mooney Problem Check Lists

(2) Problem or major purpose

The primary purpose of this paper is to provide additional validity data for the Test Anxiety Inventory (TAI; Spielberger, 1980), an instrument described at greater length in the previous paper. Most of the data presented in the preliminary manual for this new instrument are of a construct nature and consider correlations of the TAI with other personality measures. The approach used here is different in that the items with which the TAI is related may be viewed as self-reports of discrete problems or behaviors. While this approach may have limitations, it offers validity information in addition to the factor analytic approach and correlations with other personality scales.

A second purpose of the paper is to extend our knowledge and understanding of the nature of test anxiety (TA). It is believed that an exploration of the items on the Mooney Problem Check Lists (PCL; Mooney & Gordon, 1950) which relate to TA will enhance our understanding of TA. One theoretical approach to the development and nature of TA is that of Sarason, Davidson, Lighthall, Waite, and Ruebush (1960) who assert that TA is caused by parents who criticize, devalue, and demand perfection from their children. The child who, in turn, has become hostile toward the parents, is reluctant to express this hostility for fear of retaliation.

(3) Subjects

About 1200 incoming students were invited to take a battery of psychological tests as part of a freshman testing program at a medium-size private college in a metropolitan area. About 600 students accepted the invitation. Within this group, 525 subjects (233 females and 292 males) provided fairly complete data and it is these data that are presented here.

(4) Procedure

The psychological instruments administered within the battery of tests were the TAI of Spielberger (1980) and the PCL (Mooney & Gordon, 1950). As discussed at greater length in the previous paper, the psychometric underpinnings and procedures for the development of the TAI were very thorough. The PCL, on the other hand, is not a test and has virtually no psychometric properties. Norms for the PCL are not available from the authors. According to the instructions, the subject indicates which of the items (statements) are problems and may select as many (or as few) as he or she wishes.

The problem of response sets is of considerable importance in self-report instruments of personality, and the free response format of the PCL appears to be especially vulnerable to acquiescence—or the tendency to check off items or problems (Couch & Keniston, 1960; Jackson, 1973). We have, therefore, included the total number of problems a subject underlined as a covariate to control for acquiescence.

For each item on the PCL, separate analyses of covariance were performed for the worry and emotionality measures of the TAI. (TAI total score was omitted because of space limitations and tendency to mirror the significance already reflected in TAI worry and emotionality.) There were two independent variables: (a) item selection (checked or not checked) and (b) gender of

subject. Therefore, 660 analyses of covariance (330 PCL items X 2 dependent variables) were performed.

Because of the large number of analyses performed, it was decided to adopt the .02 significance level rather than the conventional .05 level. Those items checked by fewer than 20 subjects were excluded even though statistically significant. These decisions should decrease the number of significant results due to chance factors alone and should make the results more reliable.

(5) Results and Discussion

PCL items significantly associated ($p<.02$) with TA are presented in Table 1. (For each of the F's reported, there was 1 df in the numerator and 520 in the denominator.) Adjusted mean emotionality or worry scores for those checking and not checking the item are presented in the Table. These adjusted means were collapsed (weighted average) over gender. The mean anxiety scores for those checking a Mooney PCL problem were computed for numbers of subjects ranging between 22 and 177 with a median of 76.

A few words about the covariate, number of Mooney problems underlined. In our correlational data, we found correlations between number underlined and worry emotionality and total of .364, .319, and .370. These were significant at the 1 in 10,000,000 level or better. The output on the covariance analyses gave significance levels to only four places and these generally appear as .0000. So we can say that the covariate was significant at the 1 in 10,000 level or better, and we can conclude that the selection of covariate was worthwhile. Additionally, one realizes that test anxiety is very much related to number of problems checked on the Mooney PCL, with more anxious persons checking more problems.

Now we will summarize the results, grouping them according to TAI scale on which significance was found. Some Mooney PCL items yielded significantly different means on TAI emotionality. Others resulted in significant differences on the TAI worry scale. Finally, there were two Mooney items with significant mean differences for both worry and emotionality.

There were ten Mooney PCL items or problems with significant differences in TAI emotionality scores between those checking and not checking the Mooney PCL item. The Mooney problems are the following:

1. "Nervousness" - Those checking "nervousness" on the Mooney showed significantly higher scores on the TAI emotionality scale. Nervousness is synonymous with the emotional component of anxiety.

2. "Easily distracted from my work" - Those checking this item on the Mooney had significantly higher scores on the TAI emotionality scale. Distractibility seems to be associated with test anxiety so this result makes sense.

3. "Textbooks too hard to understand" - Those who indicated they had a problem with this had higher TAI emotionality scores. Not only does this result fit in with the nature of test anxiety, but it suggests that anxiety may interfere with the ability to understand the work.

4. "Losing friends" - Apparently the students who check losing friends as a problem have <u>lower</u> TAI emotionality scores than those who don't check this item. It's difficult to interpret this result. Pernaps the test anxious person doesn't have that many friends so is less likely to lose them. or perhaps the test anxious person is emotionally dependent, clinging even to relationships.

5. "Trouble with oral reports" - As one would expect, those checking this were higher in TAI emotionality than those who did not check the item.

6. "Wanting to improve my manners or etiquette" - Those who checked this item were significantly lower in TAI emotionality. One can't be certain if this result means that the test anxious person doesn't view this desire as a problem or if the response reflects the test anxious person's perfectionism.

7. "Not taking things seriously enough" - Those checking this item were lower in the emotional component of test anxiety. This item, as with the previous one mentioned, suggests a pattern of perfectionism.

8. "Wanting to understand more about the Bible" - Those who checked this item were significantly lower in TAI emotionality. It may be that the test anxious persons are saying that they already understand enough about the Bible, or it may be they are saying that their wanting to understand more about the Bible is not a problem for them.

9. "Unable to express myself well in words" - As one would expect, those who checked this item were higher in TAI emotionality than those who did not. It may be that some test anxiety is in fact an inability to express oneself in words during a test.

10. "Lacking self-confidence" - Those checking this item were higher in TAI emotionality than those who did not. Lack of self-confidence is commonly associated with anxiety.

In looking over these ten items which differentiated TAI emotionality, one is not struck by the emotional content of the Mooney PCL items. "Nervousness" certainly does connote emotionality, but most of the other items such as "easily distracted from my work," "textbooks too hard to understand," "trouble with oral reports," "wanting to improve manners or etiquette," and "not taking things seriously enough" do not connote emotionality very strongly.

The next Mooney items we'll discuss are those which differentiate on TAI worry.

1. "Going with someone my family won't accept" - Those checking this as a problem seem to have lower TAI worry scores. The test anxious person probably conforms to familial wishes; therefore, it is not a problem.

2. "Not knowing how to study effectively" - Those checking this item on the Mooney have significantly higher TAI worry scores. This result fits in with test anxiety, particularly the view that test anxiety is often ineffective study habits.

3. "Inadequate high school training" - Those who check this Mooney item have significantly higher scores on the TAI worry. Similar to the previous item, the idea is that what is commonly called test anxiety may really be inadequate training and preparation.

4. "Weak in writing" - Those who checked this item had significantly higher TAI worry scores. This is another of those deficiencies that may cause test anxiety and is sometimes confused with test anxiety.

5. "Teachers too theoretical" - The students who checked this item were significantly higher in TAI worry than those who did not. The anxious person is usually better able to deal with more concrete concepts than with the theoretical. Again, perhaps the anxiety is a manifestation of the inability to deal with the complex tasks rather than anything more than that.

6. "Having a certain bad habit" - Those who checked this item were lower than those who did not. This may be another attempt by the test anxious person to not allow for imperfections.

7. "Fearing failure in college" - Understandably those who checked this item were higher in TAI worry than those who did not do so. Test anxiety, test performance in college, and college failure are closely intertwined.

8. "Lacking self-control" - Those who checked this were lower in TAI worry than those who did not do so. Again, we may be seeing perfectionistic tendencies.

To summarize the findings discriminating on TAI emotionality, the items which significantly differentiated on worry seem to have a lot to do with academic preparation and study skills. Perhaps those with a high TA worry component worry about academic deficiencies that may be imaginary. It is also possible that the academic deficiencies are quite real and what we call Test Anxiety is a reality-based fear due to inadequate skills and preparation. This view will come up again in the next paper.

There were two items which discriminated on both worry and emotionality. Those items were the following:

1. "Trouble organizing term papers." - Those who checked this item were higher in both worry and emotionality on the TAI.

2. "Worrying about examinations" - Those checking this item were significantly higher in both worry and emotionality than those who did not do so. Ironically, the significance level was substantially higher for the emotionality scale than it was for the worry scale.

In summary, many of the PCL items were closely related to adjustment to college work and curriculum and teaching procedures. Those who were easily distracted from their work, found textbooks too hard to understand, had trouble organizing term papers, had trouble with oral reports, were unable to express themselves well in words, or worried about examinations, were significantly higher in TAI emotionality. Students who, on the PCL, said they did not know how to study effectively, had inadequate high school training, were weak in writing, had trouble organizing term papers, found teachers to be too theoretical, worried about examinations, or feared failure in college, were significantly higher in TAI worry. While these items strongly support the validity of the TAI as a measure of TA, little emerges in this research to support the TAI's distinction between emotionality and worry.

Many of the PCL items for which we obtained significance may reflect the fear of criticism and rejection that characterizes the psychoanalytic view of TA as described by Sarason et al (1960). According to their theory, the test anxious person is sensitive to criticism and devaluation, probably because of a history of parental expectations that the child be perfect. The child experiences strong guilt in response to the hostility he or she feels toward the devaluing parent. Perhaps it is in an attempt to ward off this hostility and guilt that high test anxious students do not see themselves as "having a

certain bad habit," as "lacking self-control," as "going with someone their family won't accept." They may have had enough moral and religious training so they don't want to improve their manners or etiquette or understand more about the Bible. We, therefore, believe that many of our findings are consonant with Sarason's theory.

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Validation of the Test Anxiety Inventory
Using Items from the Mooney Problem Check List

Table 1

Adjusted Mean TAI Worry or Emotionality Scores for Significant ($p<.02$) PCL Items

Mooney PCL No.	Problem	TAI Scale	TAI Mean: not checked	TAI Mean: checked on PCL	F
23	Nervousness	E	14.5	16.7	31.64****
30	Going with someone my family won't accept	W	12.9	11.7	6.80**
41	Not knowing how to study effectively	W	12.5	13.3	7.82**
42	Easily distracted from my work	E	14.8	15.8	7.34**
45	Inadequate high school training	W	12.7	14.3	8.68**
54	Textbooks too hard to understand	E	15.0	16.2	6.18*
72	Losing friends	E	15.3	14.0	6.51*
98	Weak in writing	W	12.9	13.9	12.08***
153	Trouble organizing term papers	W	12.6	13.7	8.97**
		E	14.9	16.4	10.03**
155	Trouble with oral reports	E	14.9	16.0	6.52*
179	Wanting to improve my manners or etiquette	E	15.3	13.1	9.43**
190	Not taking things seriously enough	E	15.3	13.5	10.19*
202	Wanting to understand more about the Bible	E	15.3	13.4	7.11**
208	Unable to express myself well in words	E	14.9	16.4	7.78**
220	Teachers too theoretical	W	12.7	14.7	7.05**
243	Lacking self-confidence	E	14.9	16.0	5.57*
258	Having a certain bad habit	W	13.0	11.3	11.03***
261	Worrying about examinations	W	12.5	13.9	15.50***
		E	14.5	17.7	55.99****
265	Fearing failure in college	W	12.6	13.5	7.08**
315	Lacking self-control	W	12.9	11.5	7.22**

Note: The higher mean of each pair is underlined.
*p<.02
**p<.01
***p<.001
****p<.0001

Third paper

(1) Title of paper

The Test Anxiety Inventory related to the Survey of Study Habits and Attitudes and selected scales of the Strong-Campbell Interest Inventory

(2) Problem or major purpose

Results from Test Anxiety (TA) treatment studies appear to indicate a relationship between TA and study skills. Allen (1971, 1973) found that study skills training resulted in significant decreases in self-reported TA. A number of studies have found combinations of study skills and relaxation or desensitization effective in reducing TA and increasing grades (Allen, 1971, 1973; Mitchell, Hall, & Piatkowska, 1975; Mitchell & Ng, 1972). The combined treatments are generally more effective than either treatment alone.

As discussed in previous papers within this symposium, TA has been shown to have two components: worry and emotionality. Students who experience test worry spend time during examinations producing and attending to self-oriented negative responses rather than focusing on test items. Students with test emotionality are often anxious and uncomfortable, but this generally does not affect performance as does test worry (Morris & Liebert, 1969). Tryon (1980) suggested that study skills training may reduce the worry component of TA and thus help to increase grades by training students to focus on exam questions. As a result, students would spend less time making and focusing on negative self-reference statements.

On the basis of their research, Kirkland and Hollandsworth (1980) concluded that TA should be reconceptualized as ineffective test taking. However, recent evidence presented by Paulman and Kennelly (1982) indicates that the TA component which interferes with exam performance is test worry. Sometimes training in effective test-taking skills can compensate for deficits

caused by test worry; however, increased task demands lead to performance declines even among students having good test-taking skills.

There have been few studies which have correlated TA with study habits and attitudes. Spielberger (1980) presents data relating to TAI subscales and a measure of study skills in college students. However, the study skills measure used was not stated. A member of the Spielberger group (Gonzalez, 1978) did administer the Survey of Study Habits and Attitudes (SSHA; Brown & Holtzman, 1967) and the TAI both before and after treatments aimed at decreasing TA; as the focus was treatment and outcome, the correlations between the TAI subscales and the SSHA subscales were not computed (Gonazlez, 1982). Because this information is currently lacking, a major purpose of this paper is to provide correlational information relating the TAI to specific self-report indices of study behaviors and attitudes.

This study also sought to extend TAI research by relating TAI scores to the following selected scales of the Strong-Campbell Interest Inventory (SCII; Campbell, 1977): school subjects liked percentage, academic comfort, occupational introversion-extroversion, and six occupational themes: realistic, investigative, artistic, social, enterprising, and conventional. It seemed reasonable to assume that test anxiety would relate to the percentage of school subjects students like and to how comfortable students are in an academic environment. It also seemed reasonable to investigate a relationship between test anxiety and extroversion-introversion.

The Strong-Campbell general occupational themes were proposed by Holland (1973) as indicators of individuals' life styles. The realistic theme characterizes people who have mechanical and technical interests. These people are politically conventional and lacking in interpersonal skills. Their lives are oriented toward physical activity. The investigative theme

includes people who have analytic and scientific interests. High scorers on the investigative theme enjoy introspection and problem solving. They are independent and asocial. The artistic theme includes people who have self-expressive interests and interests in the arts. Artistic types enjoy unstructured situations, enjoy freedom of expression, and are more prone to suffer from emotional difficulties than individuals characterized by other themes. People who are interested in helping others are characterized by the social theme. Social types like to work with groups and enjoy relating to others on a feeling rather than an intellectual level. People with entrepreneurial and political interests are characterized by the enterprising theme. These people enjoy leadership positions and challenging social tasks. Finally, the conventional theme includes people who have clerical interests. Conventional types prefer structured situations and consider themselves efficient and practical. It was expected that test anxiety would relate to students' lifestyle preferences.

(3) Subjects

The population from which these subjects were drawn is essentially the same as for the previous paper. About 1200 incoming students were invited to take a battery of psychological tests at a medium-size private college in a metropolitan area. About 600 students accepted the invitation. Within this group, 515 subjects provided complete data on the variables of interest within this paper, and it is these data that are presented here.

(4) Procedure

The psychological instruments administered were the TAI (described within the first two papers presented in this symposium), Form C of the SSHA, and the SCII. The SSHA was scored for the study habits subscales of delay avoidance and work methods and for the study attitudes subscales of teacher acceptance

and educational approval. Pearson product-moment correlation coefficients were computed among the four study habits and attitudes and the three TAI measures. School subjects liked percentages, academic comfort scores, introversion-extroversion scores, and the six general occupational theme scores from the SCII were recorded and correlated with the three TAI measures.

(5) Results & Discussion

The correlational results for males and females between TAI measures and SSHA and SCII measures are presented in Table 1. Study habits and attitudes were significantly negatively related to total test anxiety and to test worry for both men and women. The relationship between test worry and sstudy habits and attitudes is in line with research cited in the introduction. As indicated there, test worry and poor study and test-taking skills combine to produce information processing deficits which lower test performance (Paulman & Kennelly, 1982). One would, therefore, expect individuals with test worry to view education and teachers somewhat negatively since the test-taking process associated with school and teachers is not a pleasant experience for them.

The correlations between test emotionality and study habits and attitudes were lower than those between study habits and attitudes and test worry. Test emotionality was significantly negatively related to all study habit and attitude variables for men only. For women, a significant negative relationship between work methods and test emotionality was found, but no significant relationships were found between test emotionality and other study habits and attitudes. These correlations indicate a significant amount of emotional stress associated with poor study habits and attitudes for men while emotional distress was only associated with poor work methods for women.

Some of the common variance between test emotionality and study habits and attitudes could be explained by the positive relationship (r = .64 to .71) between test worry and test emotionality found by Spielberger, Gonzalez, Taylor, Algaze, and Anton (1978). As in any correlational research, causality cannot be definitely attributed. Poor study habits and attitudes may result in higher TA; or higher TA may interfere with study habits and attitudes. There is even the possibility that another variable (e.g. those formulated by Sarason et al (1960) as discussed in the previous paper) may "cause" both phenomena.

More correlations between SCII and TAI were significant for women than for men. In general, few significant relationships were found between SCII and TAI measures particularly for men. High total test anxiety and worry in women was associated with general academic discomfort, a liking for few school subjects, and little inclination toward an artistic lifestyle. High total test anxiety in women was also associated with shyness, while high test worry in women was associated with little inclination toward an investigative lifestyle. In contrast to test anxious college women who were uncomfortable in their surroundings and retiring with little interest in either the arts or the sciences, test anxious college men were inclined to be interested in mechanical pursuits (as indicated by the positive correlation between test worry and the realistic theme score). No other significant relationships were found for men. Thus, test anxiety had a greater impact on women's than men's lifestyles as assessed by the SCII.

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The Test Anxiety Inventory related to the Survey of Study Habits and Attitudes and selected scales of the Strong-Campbell Interest Inventory

Table 1

Variable		Test Anxiety Inventory Total	Worry	Emotionality
	Females (n=233)			
SSHA	delay avoidance	-0.20*	-0.32***	-0.11
	work methods	-0.52***	-0.57***	-0.37***
	teacher acceptance	-0.27**	-0.38***	-0.15
	educational approval	-0.27**	-0.38***	-0.15
SCII	school subjects liked	-0.18*	-0.20*	-0.11
	academic comfort	-0.22**	-0.30***	-0.11
	extroversion-introversion	0.17*	0.13	0.13
	realistic	-0.11	-0.12	0.07
	investigative	-0.16	-0.21*	-0.09
	artistic	0.18*	-0.21*	-0.11
	social	-0.13	-0.17	-0.08
	enterprising	-0.09	-0.04	-0.07
	conventional	-0.06	-0.08	-0.05
	Males (n=282)			
SSHA	delay avoidance	-0.23**	-0.29***	-0.21**
	work methods	-0.48***	-0.48***	-0.42***
	teacher acceptance	-0.39***	-0.42***	-0.34***
	educational approval	-0.34***	-0.39***	-0.30***
SCII	school subjects liked	-0.07	-0.07	-0.07
	academic comfort	-0.13	-0.13	-0.14
	extroversion-introversion	0.10	0.06	0.12
	realistic	0.12	0.17*	0.07
	investigative	-0.09	-0.10	-0.08
	artistic	-0.04	0.00	-0.05
	social	-0.04	-0.04	-0.05
	enterprising	0.13	0.15	0.09
	conventional	0.07	0.04	0.05

*$p<.01$
**$p<.001$
***$p<.0001$

Fourth Paper

(1) Title of paper

Measuring Test Anxiety With the A-State Scale of the State-Trait Anxiety Inventory

(2) Problem or major purpose

The state or trait nature of test anxiety (TA) has been a subject of controversy. Some (Hedl, 1972; Trent & Maxwell, 1980) have felt that the evidence supported a view of TA as a trait because the A-Trait scale of the State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, & Lushene, 1970) was a better predictor of TA than was STAI A-State, even when A-State was measured under examination stress conditions. On the other hand, a member of the Spielberger group (Taylor, 1977, 1982) presented factor analytic results which lent strong support for the view of TA as A-State. Factor analyzing the 37-item Test Anxiety Scale of Sarason (1972), A-State under examination stress and A-Trait were also analyzed as marker variables. Exam A-State had high loadings for Factors I (both sexes) and II (males only). Only for Factor III, a relatively weak factor, did A-Trait have a high loading. Furthermore, Spielberger, Gonzalez, Taylor, Algaze, and Anton (1978) found correlations ranging from .61 to .86 between A-State with modified instructions and the Test Anxiety Inventory (TAI; Spielberger, 1980) scales; the modified instructions directed students to respond to the A-State scale while imagining themselves in a classroom as the instructor passed out an examination. Within the same study, the correlation between TAI scales and A-Trait was lower, ranging between .41 and .54. If TA is a trait, one would expect persons with high TA to respond with greater elevations in state anxiety under examination stress conditions (DeVito & Kubis, in press-a; Spielberger, Anton, & Bedell, 1976). Therefore, in accordance with state-trait theory, TA can be described

as both a state and a trait. A conceptualization of TA which includes state anxiety has implications for research and clinical work: (a) As a state, TA could be measured with reference to specific types of anxiety (e.g., math anxiety) and specific situations (such as standardized tests); (b) the STAI A-State scale permits modification of the instructions so that anxiety may be measured with reference to a variety of situations; (c) The A-State scale could be administered to assess the relative anxiety felt by an individual in reaction to a variety of situations (not limited to tests); (d) The efficacy of clinical or experimental interventions in which anxiety changes are sought is probably better assessed with an A-State measure.

One of the drawbacks of this procedure is the intrusiveness, discomfort, and inconvenience involved in administering the A-State scale to subjects during an examination. This drawback may be avoided by asking the subject to recall how he or she felt during the test while responding to the A-State scale after the examination has been taken. In fact, Spielberger et al (1970) recommend using the A-State scale with modified instructions for any situation or time period of interest.

The focus of the remainder of this paper is the equivalence of actual and recalled measures of TA obtained via the A-State scale. Two conditions must obtain for the two measures to be equivalent: (a) The recalled measure should give results that are neither higher nor lower than the actual TA measures and (b) correlation between actual and recalled TA should be significant and account for a substantial portion of the variance. The latter condition has been investigated by DeVito & Kubis (in press-a) in a previous study. The A-State scale was administered to students with instructions (modified) to "recall" how they felt "immediately before" the last course examination. The scale was also administered to the same subjects immediately before the final

course examination with standard instructions. The correlation between actual and recalled test anxiety was .54 ($p<.01$) for the males and .75 ($p<.001$) for the females. The true relationship is likely to be even higher because the exams of reference for actual and recalled TA were different. The significantly higher recalled TA also found may well have been an artifact of the experimental design.

The current study focused on the equivalence of actual and recalled TA. Anxiety measures were taken (a) immediately before an examination ("actual TA"); (b) after an exam, but "before feedback" with recall instructions; or (c) after an exam, but "after feedback," with recall instructions.

(3) Subjects

Subjects were college students enrolled in introductory psychology courses at branches of a very large city university system. Participation was in non-interactive class-size groups during regular class periods. There was a total of 273 subjects (174 females and 99 males) participating in the research. Each subject was tested for only one of the TA measures. The number of subjects by gender and experimental condition may be found in Table 1.

(4) Procedure

Form B of a 10-item version of the A-State scale of the STAI (DeVito & Kubis, in press-b) was administered once to each subject at one of the following three times: (a) immediately before a course examination with standard instructions; (b) several days after a test, but before feedback was given, using recall instructions under which subjects were asked to recall how they felt immediately before the examination; or (c) after feedback (grade) had been received using the same recall instructions. Subject assignment to one of three groups depended on the assignment of the class in which they were

enrolled. Class assignment to treatment was random.

(5) Results

The means and standard deviations of the TA measures under each condition may be found in Table 1. An analysis of variance was performed with gender and type of TA (actual, recalled before feedback, or recalled after feedback) as the factors. The results of the analysis of variance are presented in Table 2. There was no significant difference between actual TA (measured at the time of the exam), recalled TA before feedback and recalled test anxiety after feedback.

As the three groups of subjects are independent (i.e., no repeated measure of TA), a direct correlation between actual and recalled TA was not possible. Therefore, subjects were matched on the basis of another relevant variable which was available, Form A of the 10-item A-Trait scale (DeVito & Kubis, in press-b). The correlation coefficients obtained, .26 for males and .16 for females, were not statistically significant.

(6) Discussion

The result of no significant difference between recalled and actual TA offers additional support for the procedure of having subjects recall their reactions to stressful situations while responding to the A-State scale of the STAI. The high correlations between the various measures of the TAI and A-State with instructions to "imagine" taking the test (as reported by Spielberger et al, 1978) also underscores the validity of using A-State with modified instructions to measure TA.

As was mentioned in the introduction, there are many situations under which it would be advantageous to use the A-State scale of the STAI to measure test anxiety rather than the TAI. As was suggested in the first paper, there may be situations under which it would be desirable to employ both the TAI and

the A-State scale with recall instructions.

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Table 1

Means, Standard Deviations and Sample Sizes

For Each Gender Under Each Experimental Condition

			Recalled Test Anxiety	
		Actual Test Anxiety	Before Feedback	After Feedback
Females	M	22.47	24.30	25.27
	SD	5.57	5.59	6.42
	n	60	70	44
Males	M	22.21	21.83	22.60
	SD	5.60	5.86	6.01
	n	34	30	35

Table 2

Analysis of Variance Comparing Actual Test Anxiety and

Recalled Test Anxiety Before and After Feedback

Source	df	MS	F
Gender (G)	1	201.12	5.95*
Type of TA (T)	2	52.60	1.56
GT	2	37.75	1.12
Error	267	33.79	

*$p<.05$